PEGGY GREB (K9427-1)

A BETTER Fruit Fly Trap

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Chemist Robert Heath inspects captured flies in a modified McPhail trap.

As early as 1929, the Mediterranean fruit fly—*Ceratitis capitata,* or medfly—had made its mark in the fruit orchards of Florida. From a distance, a veritable cornucopia of fruits and vegetables—peaches, pears, peppers, plums—may have looked pristine, but on closer inspection, the "hole" truth revealed itself.

The adult female medfly damages ripe fruit by making a hole and depositing her eggs under the skin of the fruit. Once the larvae hatch, they satisfy their ravenous appetites by feeding on the pulp inside the fruit, rendering it unfit for human consumption.

After apparently being

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The improved version of the McPhail trap uses a combination of three chemicals to attract male and female fruit flies. The older version of the trap used a protein bait that captured large numbers of nontarget insects.

Fruit flies attack many fruits and vegetables. Below: Fruit fly larvae feast on surinam cherries.

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eradicated by 1930, the medfly was spotted again in 1956 in Miami. Since then, periodic infestations have occurred in California, Texas, and Florida.

ARS efforts to prevent establishment of medfly, as well as all other fruit flies, have led to development of a new, recently patented trapping system that will help fruit growers control this formidable pest.

Of the world's many agricultural pests, the medfly remains one of the most destructive. The USDA's Animal and Plant Health Inspection Service estimates that the medfly alone would generate agricultural losses of about $1.5 billion a year if it were to become established in the continental United States. These losses would result from export sanctions, lost markets, treatment costs, reduced crop yields, deformities, and premature fruit drop.

In response to this potential threat, ARS chemist Robert R. Heath and entomologist Nancy D. Epsky have invented a dry trap that combines chemical and visual stimuli to more effectively control fruit flies—including the medfly. The work was done at the ARS Center for Medical, Agricultural, and Veterinary Entomology, in Gainesville, Florida.

Traditional methods for monitoring, controlling, and eradicating fruit flies have relied on traps that use a variety of chemical compounds or protein. "Chemical attractants are effective in attracting male fruit flies but not females," says Heath. "The traps also use sticky materials to retain the captured insects. These materials are difficult to use, and they require extensive maintenance," he adds.

Since female fruit flies need protein to ensure fecundity, protein is used in traps to attract them. One such device currently being used for monitoring—the bell-shaped McPhail trap—is baited with protein. But it's cumbersome and has disadvantages, such as difficulty in baiting the trap and removing trapped insects. Traps using protein baits also capture large numbers of nontarget insects.

A newer version of the trap uses a combination of chemical and visual stimuli to attract and trap the fruit flies. "A key to its success is its ability to capture both female and male fruit flies and to trap females before they've had an opportunity to lay their eggs in fruit," says Heath.

The chemical stimulus is derived from three chemicals that have been isolated from food baits—ammonia, putrescine, and trimethylamine. The three chemicals lure the flies into the trap, where they are enticed to feed on a panel that contains a feeding stimulant and toxicant.

"We've found that female fruit flies prefer different release rates of the ammonia-and-putrescine blend," says Heath. "This discovery allows us to selectively capture sexually mature or immature unmated flies or sexually mature mated flies by varying the amount of the chemical blend," he adds.

The cylindrical shape of the trap provides the visual stimulus by mimicking the three-dimensionality of host fruit. Clear panels at the top and bottom take advantage of the flies' instinctive desire to move toward light, where the lethal, sugary toxicant awaits them.—By **Jesús García,** ARS.

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